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Measurements of Photon Stimulated Desorption from a Copper Beam Chamber after Complete Removal of Surface Oxide

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Beamline(s): U9A

Photon Stimulated Desorption (PSD) was measured on NSLS beam line U9A at Brookhaven National Laboratory. PSD measurements were measured from a copper beam chamber after completely removing the surface oxide to determine the effect of no oxide. Specular photon reflection was also measured. PSD causes the pressure to rise in accelerator and storage ring vacuum, which limits their performance. For this experiment, a KEKB factory chamber from a previous experiment (1) was chemically etched and chemically cleaned prior to installation on beam line U9A. Previous PSD measurements have shown that this treatment removes any memory of prior photon exposure or any previous conditioning. After installation, the copper chamber and end stop were vacuum baked to 250 degrees Centigrade for more than a week to completely remove vacuum surface oxides (2). The chamber was exposed to more than $1\text{E}+24$ photons directly from the source having a critical energy of 595 eV and striking at an incident angle of 100 mrad. The major PSD yields for hydrogen, carbon monoxide, carbon dioxide, methane and water are reported as a function of accumulated photon flux and preparation. The PSD yields for the copper chamber, after oxide removal, were found greatly reduced, when compared to previous measurements at this laboratory and those reported from other laboratories. Specular photon was hardly changed after surface oxide removal.

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References: (1) C.L. Foerster, C. Lanni, K. Kanazawa, J. Vac. Sci. Technol. A19, 1652 (2001)
(2) F. Watanabe, J. Vac. Sci. Technol. A19, 640 (2001)

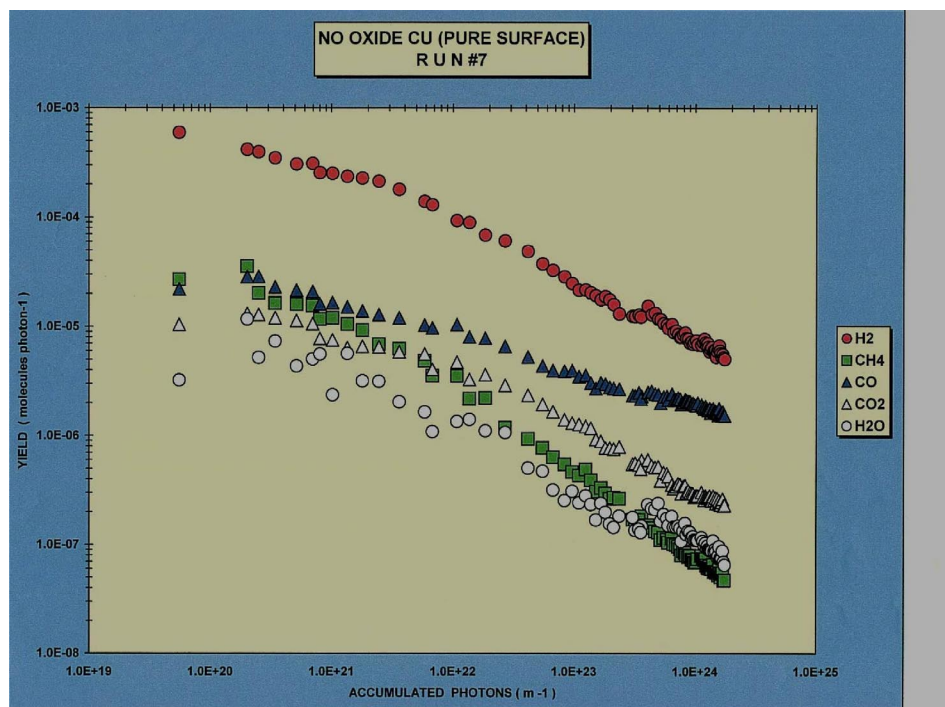


Fig. 1. Molecular desorption yields for pure copper chamber, chemically cleaned and inset 250 degree centigrade vacuum baked, for more than a week (Run # 7).